OFFICE OF WATER QUALITY
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
ASSESSMENT BRANCH
Environmental Toxicology and Chemistry Section

INFORMATIONAL PAGE

IDEM Document Control Number: IDEM/100/29/453/05/2001

Date: March 16, 2001

Title: Water Quality Assessment for the Development of Total Maximum Daily Loads for Ammonia-Nitrogen in Habegger Ditch, Adams County

Sample Matrix: Water (X); Sediment ( ); Fish Tissue ( )

Location: Maumee River Basin

Hydrologic Unit Code: 04100004

Author and Title: Jennifer Hutchison, Environmental Scientist III

Abstract or Summary:
The purpose of this study was to assess the impairment of Habegger Ditch for ammonia-nitrogen. Habegger Ditch was placed on the 1998 303(d) List of Impaired Waterbodies for ammonia-nitrogen. Three sampling events were completed in the summer through fall of 2000 to assess the ammonia-nitrogen impairment. Habegger Ditch was assessed using the GLI Water Quality Standards for ammonia-nitrogen. The first sampling event showed no ammonia-nitrogen violation. On the second sampling event, site LES040-0016 had an ammonia-nitrogen concentration of 3.90 mg/L, which violated the ammonia quality standard of 2.124 mg/L. LES040-0016 was located on Sprunger Ditch, which is a tributary of Habegger Ditch. LES040-0015, the downstream site, showed no ammonia-nitrogen violation. The third sampling event had no ammonia-nitrogen violations. It is recommended that since no ammonia-nitrogen violations occurred on Habegger Ditch, the ammonia-nitrogen impairment for Habegger Ditch be removed from the 303(d) List of Impaired Waterbodies.

Keywords: TMDL, Habegger Ditch, ammonia-nitrogen

Availability: Hard copy and electronic copy

IDEM/100/29/453/05/2001

Water Quality Assessment for the Development of Total Maximum Daily Loads for Ammonia-Nitrogen in Habegger Ditch, Adams County

By: Jennifer Hutchison
Environmental Scientist
Environmental Toxicology and Chemistry Section
Assessment Branch, Office of Water Quality
(317) 308-3142
jhutchis@dem.state.in.us

Indiana Department of Environmental Management
100 N. Senate Avenue
P.O. Box 6015
Indianapolis, IN 46206-6015

March 16, 2001

Table of Contents

Attachments (Contact office for copies of attachments)

Introduction

Habegger Ditch is located in Adams County near Berne. Habegger Ditch is on the Indiana's 1998 303(d) list for ammonia. A sampling event occurred in 1992 under Segment 21, St. Mary's River segment report, which shows water quality violations for ammonia. Using the USGS Partial Gaging Station Blue Creek near Pleasant Mills data, it has been determined that Habegger Ditch has zero Q7-10 low-flow. There are no determined point source discharges discharging to the Habegger Ditch.

Methods

A. Sampling Sites and Locations

Seven sites were chosen on Habegger Ditch and its tributary to be sampled. Six sites were chosen along Habegger Ditch. The other sampling site was located on Sprunger Ditch before it flows into Habegger Ditch. These sites were chosen to represent all sources that could be attributing to the impairment of Habegger Ditch. See Figure 1.

B. Sample Collection

A presurvey was completed on June 13, 2000 to determine if the sites could be sampled. All seven sites were approved for sampling. The three sampling events took place on July 13, 2000, September 14, 2000, and November 14, 2000. These sites were sampled as a grab sample using a stainless steel bucket dropped over a bridge. All samples were collected in 1000mL plastic round neck bottles and preserved with Sulfuric Acid. Nutrients were sampled during the first sampling event. Nutrient samples were also collected in 1000mL plastic round neck bottles and preserved with Sulfuric Acid. Indiana State Department of Health Lab analyzed all samples.

C. Field Measurements

Field parameters were measured at each site during each sampling event using the YSI™, multiparameter data sonde, as stated in the work plan. These parameters included pH, water temperature, specific conductivity, turbidity, percent saturation, chloride, and chlorophyll. Field calibrations were completed for dissolved oxygen using a Winkler Test, and pH using a Hach pH meter. Weather conditions, wind strength, air temperature, and cloud conditions were also noted at each site for each sampling event.

D. Protocol Deviations

Three deviations occurred in the work plan over the sampling events. These changes reflected the change in the purpose of the sampling event. The purpose was changed from collecting data for a TMDL analysis to collecting data for the purpose of verifying the impairment. If the initial sampling event verified that the impairment existed, general chemistry, nutrients, and flow measurements were to be collected

The first deviation occurred on the first sampling run. Nutrients were collected, but general chemistry was not. Both were to be collected according to the work plan. General chemistry and nutrients were not collected on the other two sampling events. General Chemistry was not collected on the remaining sampling events due to the change in purpose of this year TMDL sampling.

The second deviation that occurred in the work plan was that no flow measurements were taken. No flow measurements were taken due to no general chemistry and/or nutrients collected. General chemistry, nutrients, and flow must be collected on the same sampling event, to be effective for modeling purposes. No flow measurements were needed based on the first sampling event showing no impairment for Habegger Ditch.

The third deviation that occurred in the work plan was sampling took place after October 31, 2000. The last sampling event took place on November 14, 2000. The last sampling event took place after October 31, 2000 due to a late start on the sampling season. In order to equally space out the sampling events, this last sampling event had to be completed in November.

Results

A. Ammonia-Nitrogen

The ammonia-nitrogen water quality standards are based on a relationship between temperature and pH (327 IAC 2-1.5-8.) Since the IDEM staff collected temperature and pH over a 24-hour period, the temperature and pH were averaged to create a mean temperature and a mean pH. The means were then used to calculate what the ammonia-nitrogen value should be at that temperature and pH. The sample collected at each site was then compared to the calculated ammonia-nitrogen value. LES040-0016 was the only site that did not meet the ammonia-nitrogen water quality standard. See Table 1 for ammonia-nitrogen results.

B. Nutrients

All nutrient results were evaluated either on numeric water quality standards (327 IAC 2-1.5-8) or by a comparison with those parameters collected by other IDEM employees in that area. All nutrients results were found to be in acceptable range except for T.K.N. The lab reagent blank failed, so the results are estimated. See Table 2 for nutrient results.

C. Field Measurements

All field data collected was collected using a YSI™. The YSI™ was calibrated by IDEM staff and was field checked according to the workplan. All of the field data was found to be valid. See Table 3 for field data results.

D. Field Observations

There were farms observed at all the sites. One outflow was observed at LES040-0012, two outflows were observed at LES040-0013, one outflow was observed at LES040-0015, one outflow was observed at LES040-0017, and one outflow was observed at the LES040-0018. Livestock was noted at LES040-0017 on the first sampling event. On the second sampling event, the water at LES040-0012 smelled like sewage and the steel drainpipe was flowing slightly on the west side. Also, the second sampling event was completed after recent heavy rains. The third sampling event was sampled during very cold weather and sleet.

Discussion

On the second sampling run, LES040-0016 had an ammonia-nitrogen violation. However, on the first and third sampling event this site met ammonia-nitrogen Water Quality Standards. LES040-0014, which is the site on Habegger Ditch that is downstream of Sprunger Ditch, showed no ammonia-nitrogen violation on any of the sampling events. It can be determined that Sprunger Ditch is causing no ammonia-nitrogen impairment on Habegger Ditch.

Recommendation

- Since there were no ammonia-nitrogen violations on Habegger Ditch, it is recommended that ammonia-nitrogen impairment for Habegger Ditch be removed from the 303(d) list of Impaired Water Bodies of Indiana.

Table 1: Ammonia-Nitrogen Results for Habegger Ditch

First Sampling Event:									
Site ID #	Stream Name	Site Info	Date	IDEM #	Sample NH3-N (mg/L)	pH	Temp (oC)	CCC	WQS Violation?
LES040-0012	Habegger Ditch	CR 200W	7/13/00	AA00256	0.30	7.900	17.78	1.510	NO
LES040-0013	Habegger Ditch	CR 500S and Swissway	7/13/00	AA00267	0.10	7.900	20.39	1.501	NO
LES040-0014	Habegger Ditch	CR 000 (B-133)	7/13/00	AA00268	0.10	8.010	21.48	1.237	NO
LES040-0016	Sprunger Ditch	CR 550S (Parr Rd)	7/13/00	AA00269	1.40	7.710	19.44	2.036	NO
LES040-0015	Habegger Ditch	CR 500S	7/13/00	AA00270	0.20	7.940	21.53	1.401	NO
LES040-0017	Habegger Ditch	CR 100E (B-116)	7/13/00	AA00271	0.10	8.190	26.72	0.851	NO
LES040-0018	Habegger Ditch	CR 500E near Confluence (B-131)	7/13/00	AA00272	0.10	8.130	25.55	0.961	NO
									NO
Second Sampling Event:									
Site ID #	Stream Name	Site Info	Date	IDEM #	Sample NH3-N (mg/L)	pH	Temp (oC)	CCC	WQS Violation?
LES040-0012	Habegger Ditch	CR 200W	9/14/00	AA01603	1.90	7.710	15.57	2.068	NO
LES040-0013	Habegger Ditch	CR 500S and Swissway	9/14/00	AA01605	0.10	7.750	16.44	1.937	NO
LES040-0014	Habegger Ditch	CR 000 (B-133)	9/14/00	AA01606	0.70	7.780	16.00	1.851	NO
LES040-0016	Sprunger Ditch	CR 550S (Parr Rd)	9/14/00	AA01607	3.90	7.660	15.61	2.124	**YES**
LES040-0015	Habegger Ditch	CR 500S	9/14/00	AA01608	0.60	7.72	16.44	2.028	NO
LES040-0017	Habegger Ditch	CR 100E (B-116)	9/14/00	AA01609	0.70	7.75	16.39	1.937	NO
LES040-0018	Habegger Ditch	CR 500E near Confluence (B-131)	9/14/00	AA01611	0.80	7.8	16.54	1.789	NO
Third Sampling Event:									
Site ID #	Stream Name	Site Info	Date	IDEM #	Sample NH3-N (mg/L)	pH	Temp (oC)	CCC	WQS Violation?
LES040-0012	Habegger Ditch	CR 200W	11/14/00	AA03062	0.10	7.69	6.79	2.278	NO
LES040-0013	Habegger Ditch	CR 500S and Swissway	11/14/00	AA03064	0.10	7.30	5.53	2.301	NO
LES040-0014	Habegger Ditch	CR 000 (B-133)	11/14/00	AA03065	0.10	7.70	5.16	2.289	NO
LES040-0016	Sprunger Ditch	CR 550S (Parr Rd)	11/14/00	AA03066	1.10	7.85	5.81	1.788	NO
LES040-0015	Habegger Ditch	CR 500S	11/14/00	AA03067	0.20	8.00	5.15	1.387	NO
LES040-0017	Habegger Ditch	CR 100E (B-116)	11/14/00	AA03068	0.20	7.43	4.90	2.320	NO
LES040-0018	Habegger Ditch	CR 500E near Confluence (B-131)	11/14/00	AA03069	0.2000	7.84	4.70	1.840581723	NO

Table 2: Nutrient Results for Habegger Ditch

Parameters	Sites						
	LES040-0012	LES040-0013	LES040-0014	LES040-0016	LES040-0015	LES040-0017	LES040-0018
Nitrate-Nitrite-N (mg/L)	11	2.8	4.5	2.6	3	4.2	5.50
* T.K.N. (mg/L)	1.2	1	1.1	3.3	1	0.8	1.10
C.O.D. (mg/L)	22.3	29.4	25.1	29.3	22.3	21.6	27.80
T.O.C. (mg/L)	5.0	6.6	6.6	6.3	6.5	6.3	6.60
* Lab reagent blank failed, so values are estimated							

Table 3: Standard Field Measurements for Habegger Ditch

First Sampling Event

Site ID #	Stream Name	Description	Sample Number	Sample Date	Special Notes	Dissolved Oxygen (mg/L)	pH	Water Temp (oC)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Chloride (mg/L)	Chlorophyll (mg/L)	Saturation %	Comments
LES040-0012	Habegger Ditch	CR 200W	AA00756	7/13/00		8.8	7.76	17.78	1972	24.5		6.1	93.1	Chlorophyll probe not calibrated
LES040-0013	Habegger Ditch	CR 500S and Swissway	AA00267	7/13/00		6.72	7.9	20.39	1993	25.6		11.2	75.6	Chlorophyll probe not calibrated
LES040-0014	Habegger Ditch	CR 000 (B-133)	AA00268	7/13/00		8.1	8.01	21.48	2102	37.3		10.2	92.1	Chlorophyll probe not calibrated
LES040-0016	Sprunger Ditch	CR 550S (Parr Rd)	AA00269	7/13/00		5.31	7.71	19.44	2364	25.6		110	58.3	Chlorophyll probe not calibrated
LES040-0015	Habegger Ditch	CR 500S	AA00270	7/13/00		9.82	7.94	21.53	2133	22.9		7.7	112.1	Chlorophyll probe not calibrated
LES040-0017	Habegger Ditch	CR 100E (B-116)	AA00271	7/13/00		12.82	8.19	26.72	2143	23		2.1	161.3	Chlorophyll probe not calibrated
LES040-0018	Habegger Ditch	CR 500E near Confluence (B-131)	AA00272	7/13/00		11	8.13	25.55	1170	23.8		6.3	137	Chlorophyll probe not calibrated

Table 3 (continued)

Second Sampling Event

Site ID #	Stream Name	Description	Sample Number	Sample Date	Special Notes	Dissolved Oxygen (mg/L)	pH	Water Temp (oC)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Chloride (mg/L)	Chlorophyll (mg/L)	Saturation %	Comments
LES040-0012	Habegger Ditch	CR 200W	AA01603	9/14/00	water smelled like sewage, steel drain pipe flowing slightly on west side; recent heavy rains	7.57	7.71	15.57	952	34	43.5	7.3	76.2	
LES040-0013	Habegger Ditch	CR 500S and Swissway	AA01605	9/14/00	recent heavy rains	8.64	7.75	16.44	732	38.7	40.66	8.4	88.6	
LES040-0014	Habegger Ditch	CR 000 (B-133)	AA01606	9/14/00	recent heavy rains	8.51	7.78	16	796	65.2	40.4	8.6	86.1	
LES040-0016	Sprunger Ditch	CR 550S (Parr Rd)	AA01607	9/14/00	recent heavy rains	7.46	7.66	15.61	1518	42	60.75	8.2	75.5	
LES040-0015	Habegger Ditch	CR 500S	AA01608	9/14/00	recent heavy rains	9.15	7.72	16.44	827	36.6	46.38	8.5	95.2	
LES040-0017	Habegger Ditch	CR 100E (B-116)	AA01609	9/14/00	recent heavy rains	9.22	7.75	16.39	833	69.3	44.9	8.3	96.6	
LES040-0018	Habegger Ditch	CR 500E near Confluence (B-131)	AA01611	9/14/00	recent heavy rains	9.42	7.8	16.54	827	61	75.49	8.4	96.8	

Table 3 (continued)

Third Sampling Event

Site ID #	Stream Name	Description	Sample Number	Sample Date	SpecialNotes	Dissolved Oxygen (mg/L)	pH	Water Temp (oC)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Chloride (mg/L)	Chlorophyll (mg/L)	Saturation %	Comments
LES040-0012	Habegger Ditch	CR 200W	AA03062	11/14/00		9.73	7.69	6.79	765	33			79.9	
LES040-0013	Habegger Ditch	CR 500S and Swissway	AA03064	11/14/00		11.28	7.3	5.53	727	47.8			89.7	
LES040-0014	Habegger Ditch	CR 000 (B-133)	AA03065	11/14/00		11.2	7.7	5.16	727	56.8			88.3	
LES040-0016	Sprunger Ditch	CR 550S (Parr Rd)	AA03066	11/14/00		9.73	7.85	5.81	881	40.5			78	
LES040-0015	Habegger Ditch	CR 500S	AA03067	11/14/00		11.53	8	5.15	753	61			91	
LES040-0017	Habegger Ditch	CR 100E (B-116)	AA03068	11/14/00		11.69	7.43	4.9	748	67.2			91.6	
LES040-0018	Habegger Ditch	CR 500E near Confluence (B-131)	AA03069	11/14/00		11.93	7.84	4.7	758	83.6			92.8	

Figure 1: Ammonia-Nitrogen Violation Status Map for Habegger Ditch